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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,304	10/14/2003	Juin Yih Lai	MR3457-45	7886

4586 7590 04/04/2006

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EXAMINER

SELLMAN, CACHET I

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/687,304	LAI ET AL.	
	Examiner	Art Unit	
	Cachet I. Sellman	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/14/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/14/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/2/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 16-19 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on January 17, 2006.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claim 5 and Figure 2, the applicant requires the step of performing at least one replacement process to replace the solution of the first composite membrane and that the coating solution is formed into a solid structure before the solution is replaced. However it is unclear from reading the specification how this replacement process takes place. The applicant states that "the replacement process comprises at least one organic solution" which does not disclose how the solution is replaced especially since it is already a solid structure. Therefore one having ordinary skill in the art would not be able to successfully perform the process of forming a composite membrane using a

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replacement process. Claims 6-10 all depend from claim 5 therefore they also not enabled.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiro et al. (US 5259950) in view of Ruckenstein et al. (US 5993661) and Huang et al. (US 2002/0053544 A1).

Shiro et al. discloses a composite membrane that can be used for separating organic mixtures (abstract, column 1, lines 3-19) which comprises providing a polymer and a substrate (column 7, lines 25-26, and 5, lines 29-30); dissolving the polymer to form a first coating (column 5, lines 62-63); performing a membrane fabrication process to coat the first coating solution onto the substrate (column 5, lines 64-68, column 7, lines 25-30); providing a second coating solution comprising a chitosan and an organic acid (column 9, lines 17-25 and Example 1).

Shiro et al. does not teach providing a nano-inorganic particle in the second solution or performing a fixation process to neutralize the membrane as required by **claim 1**.

Ruckenstein et al. disclose forming a microporous or macroporous membrane using chitosan where the pores are formed by forming a solution containing chitosan, organic acid, and inorganic porogen particles (column 3, lines 50-55 and 62-66). The membrane is immersed into an alkaline solution to dissolve the porogen and reach neutral conditions (Example 2) and the alkaline solution is removed by washing with water (column 4, lines 31-34). Ruckenstein et al. discloses that the pore size can be controlled by varying the size of the porogen (abstract) therefore the pore size is a result effective variable. It would have been obvious to one having ordinary skill in the art to use nano size particles in order to form a nanoporous membrane because Ruckenstein et al. discloses that pore size depends on the size of the porogen therefore using nano sized particles will result in nano size pores.

Huang et al. discloses forming a composite membrane that consists forming a first layer comprising an alginic acid and a second layer comprising chitosan and the membrane is immersed in an alkaline solution to convert the cationic amine groups back into free amino form, thereby accomplishing regeneration of chitosan in free amino form. The second intermediate is then washed thoroughly to remove the alkaline solution, dried and then immersed in a crosslinking solution [0042].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Shiro et al. to include the use of nano size particles and immersing the membrane in an alkaline solution as taught by Ruckenstein et al. One would have been motivated to do so because both disclose a process for forming a chitosan membrane using chitosan and an organic acid and Ruckenstein et al. further teaches that the membranes have an affinity to purification therefore one would have a reasonable expectation of success in forming the nanoporous chitosan membrane. Ruckenstein et al. further discloses that the chitosan membrane is immersed in an alkaline solution and is washed with water. Huang et al. discloses that immersing the chitosan membrane in an alkaline solution converts the cationic amine groups into free amino form therefore it would have been obvious to one having ordinary skill in the art that immersing the chitosan membrane of Ruckenstein et al. in an alkaline solution will result in neutralizing the chitosan membrane as taught by Huang et al.

Shiro et al. discloses that the membrane fabrication process consists of coating the solution with a specific thickness on the substrate; performing a phase transformation process to transform the coating into a solid structure and removing the solution as required by **claim 2**. The phase transformation comprises a polymer non-solvent to solidify the first coating solution (column 7, lines 53-56) as required by **claim 3**. Ruckenstein et al. discloses that the fixation process comprises neutralizing the

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second composite membrane by an alkaline solution and a by-product of neutralization is formed; the by product is removed by a cleaning agent and the agent is removed (Examples 1 and 2, column 6, lines 5-15) as required by **claim 4**. Shiro et al. discloses that the polymer can be acrylonitrile (column 13, lines 37-38) as required by **claim 11**. Shiro et al. discloses performing a surface modification process to modify the functional group on the first composite and washing the membrane (column 8, lines 16-62) as required by **claim 12**.

As stated above the phase transformation process comprises a polymer non solvent (column 7, lines 53-56) as required by **claim 13**. In regards to **claim 14**, Shiro et al. does not disclose that the surface modification process comprises an alkaline solution with a concentration greater than 0.25 N. However, Shiro et al. does teach that the surface modification process will affect the heat resistance, chemical resistance and hydrophilicity of the membrane therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a concentration within the claimed range through routine experimentation. One would have been motivated to do so in order to form a composite with increases heat resistance, chemical resistance and hydrophilicity especially absent any criticality in using the concentration in the claimed range. Ruckenstein et al. further discloses that the alkaline solution comprises NaOH (Example 2) as required by **claim 15**.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cachet I. Sellman whose telephone number is 571-272-0691. The examiner can normally be reached on Monday through Friday, 7:00 - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cachet Sellman
Patent Examiner
AU 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER